Index

Isotopes and Radiation Technology

Volume 5

The page range for each of the four issues of Vol. 5 is as follows:

No. 1, pages 1 to 88
No. 2, pages 89 to 168
No. 3, pages 169 to 267
No. 4, pages 269 to 349

A

AAEC
(see Australian Atomic Energy Commission)
Accelerators
(see also Linear accelerators)
installation of Dynacote particle, 162
Actinides
separation of, bibliography on methods for, 234
Activation analysis
computer-coupled, 73
development of, for use in forensic science, 66
facilities and program for, at Tracerlab Western Division, 123–24
liquid loop for, 72
technology and uses of, 171
use for determining protein content in grains, 162
use for determining trace components in white lead pigments, 288
use for process control, 72
use in trace element research in life sciences, 200–6
use in tracer studies with stable elements and isotopes, 269–77
Addition compounds
preparation and properties of ^{85}Kr-labeled clathrates, 108–9
use of ^{85}Kr-labeled, clathrates for determining O_3 and SO_2 in upper atmosphere, 109–11
Aerojet-General Nucleonics
contract with, for design of implantable power source for circulatory support systems, 64–65
contract with, for studies on radioisotopes in hydrospace, 63
Aerospace
radioisotope uses in, 65–66
radioisotope uses in spacecraft life-support systems, 63–65
Africa
radiopreservation of foods in, 61
Age estimation
use of activation analysis for, of paintings, 288
Agriculture
use of activation analysis in trace element research in, 201–2
use of radiation and radioisotopes in, in Japan, 335
use of radioisotopes in, 60–61, 157–58
Air
analysis for O_3 and SO_2 using ^{85}Kr-labeled clathrates, 109–11
analysis for SO_2 by ^{36}Cl release, 105
effects on packaging of radiopreserved seafood, 138–39
Aircraft
position indicator system for, 66
Alkali metals
solvent extraction from waste solutions, 92–101
Alpha particles
production of monoenergetic X-rays by, 70
use for measuring melting points, 123
Alpha spectrometers
use for measuring natural radioactivity, 70
Alternators
use of homopolar inductor, in Radioisotope Submersible Engine, 153
Altimeters
development of isotopic setting indicator system, 66
Aluminum
determination in carbon steel by ^{45}Ca release, 105
surface-area measurements on, using labeled surfactant method, 114
thickness of molten, for temperature measurements using ^{60}Co, 122
Ammonium compounds (substituted)
use of ^{14}C-labeled, for surface-area measurements, 114–15
use of HMAB for studying effects of surface roughness on metals, 116
Analysis
(see Radiochemical analysis)
Anger camera
description and diagnostic uses of, 45–53
Antimony oxides
use with activation analysis as tracer in atmospheric pollution studies, 275–76
Argon-41
use as tracer for measuring ventilation rates, 278–79
Aromatics
(see also specific compounds)
chlorination of, beta sources for, 41, 42
chlorination of, photochemical and radiation, 34–42
Artificial heart
use of radioisotope power system in, 178
ASDA
(see Atomic and Space Development Authority (New York))
Atlantic Research Corp.
contract with, for survey of potential MISER applications, 75
Atlantic Richfield Company
contract with, for operation of reactor fuel processing plant at Hanford, 82
Atmosphere
(see also Air)
pollution of, 169–71
pollution of tracer studies on, using stable elements and isotopes with activation analysis, 275–76
Atomic energy
motion pictures on, availability of, 347–48
personnel in, reorganization of Red Chinese, 61–62
Atomic energy (legal aspects)
of radiation-safety program, 54–58
Atomic and Space Development Authority (New York)
construction and operation of radiochemical processing plant, agreement for, 163
Australia
radioisotope production at Lucas Heights, program for, 194–99
use of radioisotopes in hydrology in, 342–45
Australian Atomic Energy Commission
sale of ^{60}Co to UKAEA by, 162
Autoradiography
use in restoration of photographs by neutron irradiation, 125
Awards
Dr. Vivian T. Stannett for work in polymer chemistry, 163

B

Bacteria
radiation effects on cod fillets inoculated with type E, Clostridium botulinum, 81–82
radiation effects on, in meats and seafoods, 222–23
radiation effects on survival of, in seafoods, 234
radiosterilization of salmonella in animal feeds and foods, 131–32
Bearings
underwater, replacement of, in high radiation field, 25–28
Bechtel Corporation
contract for radiation processing of sewage, 348–49
Benzene
chlorination of, photochemical and radiation, 35–37
melting point of, radiometric method for measuring, 123

Benzene, nitro-
safety considerations in working with, 99–100
Benzoyl peroxide
(see Catalysts)
Beta particles
backscatter by, measurement of eggshell strength by, 284–86
Beta sources
internal, for chlorination of aromatics, 41, 42
use of ^{106}Ru–^{106}Rh, in gage for measuring eggshell strength, 284–86
Bibliographies
on methods for separation of actinides, 234
on radiopreservation of fruits and vegetables, 25
on Special Sources of Information on Isotopes, 4th Rev., IIC, 162
Bioengineering
problems in development of radioisotopic power source for human implantation, 308–9
Biology
(see Life sciences)
Bismuth
thickness of molten, for temperature measurements using ^{60}Co, 122
Blood
analysis for trace elements in, activation, 203
Blood circulation
radioisotope-powered thermodynamic pump for, feasibility of, 306–12
radioscanning of, using Anger camera, 49
support systems for human, 64, 65
Blood diseases
radiodiagnosis of, 147
Body heat
(see Heat)
Bone marrow
radioscanning of, using Anger camera, 49
Blood proteins
(see Proteins)
Bone tumors
(see Tumors)
Bones
analysis of ashes of, for trace rare earths, 203
Books
"Basic Safety Standards for Radiation Protection", 1967, 159
"Isotope Index", 8th Ed., 164
"Radioisotope Measurement Applications in Engineering", 118
"Radiometric Titration", 112
"Table of Isotopes", 85
"The World of Radioisotopes", review, 62
Boron
separation of ^{10}B from, contract for, 161–62
Boron-10
separation from natural boron, contract for, 161–62
Brain
radioscanning of, method for, 147
scanning of, testing short-lived radioisotopes for, 261
Brain tumors
(see Tumors)
Bromides
solvent properties for Cs, 96–97
Bromine-82
use in hydrology in Australia, 344
Brookhaven National Laboratory
documentary on, 83
Bubble chambers
(see Radiation detectors, bubble chamber)
Bureau of Reclamation
contract with, for development of radiometric instrument for measuring water flow in turbines, 66
contract with, for development of reservoir leakage tracer techniques, 67
1,3-Butanedione, 4,4,4-trifluoro-1-(thienyl)-
solvent properties for cesium, 98, 99, 100

C

Cadmium
solubility in molten cadmium chloride, radiometric instrument for measuring, 251
thickness of molten, for temperature measurement using ^{60}Co, 122
Cadmium chloride
solvent properties of molten, for Cd, radiometric instrument for measuring, 251
Cadmium telluride
development of, for use in gamma spectrometer, 71
Calcium-45
release during aluminum determination in carbon steel, 105
Calcium-46
use with activation analysis as tracer in biology and medicine, 270–71
Calcium-48
use with activation analysis as tracer in biology and medicine, 270–71
Calcium oxides
determination in cement raw mix by X-ray fluorescence, 283
Cameras
(see Anger camera, Electron cameras, and Gamma cameras)
Canada
radiation and radioisotopes in industry, medicine, and research in, 255–58
radiosterilization of food in, program for, 133–34
Carbon-14
release during determination of moisture in gases, 107–8
Carbon dioxide
effects on packaging of radiopreserved seafood, 138–39
Carbon steel
analysis for aluminum by ^{45}Ca release, 105
Catalogs
availability of ORNL radioisotope, 85
Catalysts
effects of benzoyl peroxide, on radiation-cured plastics, 32, 33
effects of curing of benzoyl peroxide, on properties of reinforced plastics, 31, 32
Cements
analysis for calcium and iron oxides by X-ray fluorescence, 283
Cerium isotopes
purification of enriched, 101–3
Cesium
solvent extraction of fission-product, from waste solutions, 92–101
Cesium-132
production of high-specific-activity, 103
Cesium-137
solvent extraction of, from waste solutions, 92–100
use as gamma source in portable food irradiator, 289–92
use as gamma source in portable irradiation facility, 161
use as gamma source in traveling exhibit, 145–47
Cesium oxides
dissolution by HNO_3-H_2O_2, 101–3
Chemical processing
of enriched cerium isotopes, 101–3
Chemical reactions
book: "Radiometric Titrations", 112
Chemicals
(see Radiochemicals)
Chemistry
polymer, award to Dr. Vivian T. Stannett for work in, 163
use of radioisotopes in, 234
Chlorination
(see Chlorine)
Chlorine
radioinduced reactions of, with liquids, LET effects in, 40, 41
reactions with aromatics, photochemical and radioinduced, 34–42
Chlorine-36
release during SO_2 determination in air, 105
use as light source in photometer, 172
Chromium-51
use in hydrology in Australia, 343
Circuits
for scintillation camera, 48
Circulation
(see Blood circulation)
Clathrate compounds
(see Addition compounds)
Coal
analysis for ash and sulfur by X-ray fluorescence, 282–83
Coatings
curing of, radiation service and demonstration facility for, 162
Cobalt
properties of, 187
radiation effects on density and hardness of, 186
Cobalt-60
capsule material selection, fabrication, and testing for heat sources of, 189–93
development of, for use as power source, 185–94
operation of large sources of, 197–98
production and distribution of, AEC withdrawal from, 262, 347
production of heat sources of, economics and method for, 186, 190
production in private power reactor, 161
production and sales of sealed sources of, 195
sale of, by AAEC to UKAEA, 162
shipment of, to Sweden by UKAEA, 349
source-elevator for, replacement of underwater bearings in, 25–28
use as gamma source in irradiation facility for meats, 292–98
use as gamma source in Oregon State Univ. Radiation Center, 301
use for measuring temperature of molten metals, 121–22
use as radiation source in MPDI, 231
use as tracer in industry in Philippines, 332–34
Cobalt sulfates
use with activation analysis as tracer in atmospheric pollution studies, 276
Colloids
radiation effects on, 78
Colorado School of Mines Research Foundation, Inc.
contract with, for development of radioisotope techniques for pollution process control, 69

Columbia University
contract with, for radiation synthesis of artificial kidney membranes, 77
Complexes
ion-association, mechanism of formation and solvent extraction of, 93–94
Condensers
description of Dowtherm A, for use in Radioisotope Submersible Engine, 153, 154
Conferences and meetings
on Comparison of Preservation of Fish by Freezing and Irradiation, IAEA, 160
on food irradiation, 83–84
on insect pest control, 160
list of, 164
on radiosterilization of medical supplies, IAEA, 303–5
Second International, on Medical Physics, August 1969, 261
Second International Symposium on Packaging and Transportation of Radioactive Materials, 346
on use of radiation and radioisotopes for insect control, 346
Consumer products
licensing possession and use of labeled, report of review panel on, 319–20
Contamination
(see Radioactive contamination)
Controls for Radiation, Inc.
acquisition by Teledyne, Inc., 264
Copper
determination in copper ores by X-ray fluorescence, 283
surface-area measurements on, using labeled surfactant method, 114
Copper-65
use with activation analysis as tracer in biology and medicine, 273
Copper ores
analysis for copper by x-ray fluorescence, 283
Cotton
spinning machine for, development of radiometric gage for controlling, 219
Criminology
(see Forensic science)
CSREX process
solvent extraction of cesium from waste solutions, 98
Curium-244
separation from spent fuel elements at Hanford, 347
Czechoslovakia
production of labeled compounds, radiation sources, and radioisotopes in, 155–57

D

Daniel Yankelovich, Inc.
contract with, for research on economics of radiopreserved foods, 79
DEHPA
(see Phosphoric acid, bis(2-ethylhexyl) esters)
Densimeters
use of radiometric, in industry in various countries, 336–37
Density
of soils, development of radiometric gage for measuring, 251
Dichromates
determination in natural waters by ^{110}Ag release, 107
DID
(see Division of Isotopes Development)
Diet
of world population, role of radiosterilization of food in, 126–36
Diphenylamine, 2,2',4,4',6,6'-Hexanitro-
solvent properties for cesium, 94–95
Dipicrylamine
(see Diphenylamine, 2,2',4,4',6,6'-Hexanitro-)
Division of Isotopes Development, AEC
administration of new contracts by, 63–82
reports from, 86–88
Documentaries
on Brookhaven National Laboratory, 83
Donald W. Douglas Laboratories
contract with, for design of implantable power source for circulatory support system, 65
Douglas United Nuclear
decision on plutonium fabrication plant at Hanford, 266
Dowtherm A
use as working liquid in Radioisotope Submersible Engine, 149, 151, 153, 154

E

Economics
of industrial research on radiation and radioisotopes, 266
of installation and operation of electron-beam accelerator for radiation curing of plastics, 33, 34
Edsel B. Ford Institute for Medical Research
contract with, for compilation of beta-excited x-ray source spectra, 69–70
Eggs
shell strength of, beta-backscatter method for measuring, 284–86
Electron beams
curing of reinforced plastics by, commercial, 29–34
Electron cameras
design of, with image detector, 51
Electrons
use in radiation processing, 75
Elements
(see also Metals)
determination of low concentrations of, methods for, 202
determination of trace, by activation, 206–6
determination of trace, in spring water, activation, 206
determination of trace, in white lead, activation, 286
properties of trace, in soils and vegetation, neutron activation studies on, 204–6
use of stable, with activation analysis as tracers, 269–77
Emulsions
radioinduced polymerization of, 78
Energy conversion
design criterions of system for, for use with Radioisotope Submersible Engine, 152
Engineering
measurements in, use of radioisotopes for, 118
use of radiation sources in, 175
Ethylene polymers
radioinduced polymerization of, contract for plant construction for, γ, 266
Ethylene, tetrafluoro-
radioinduced polymerization of, with organic compounds, 78
Ethylene, tetrafluoro-, polymers
surface-area measurements on, using labeled surfactant method, 115
Exhibits
activities of portable ^{137}Cs food irradiator in traveling, 161
mobile, use of cesium-137 irradiation facility in, 145–47
Exports
AEC general license for, covering Soviet-Bloc countries, 82

F

Feces
collection and waste-management systems for, in space vehicles, 243–44
Films
(see also Motion pictures)
magnetic properties of thin, effects of surface roughness on, 116
Fish
preservation by freezing and irradiation, IAEA conference on, 160
radiation effects on lipids in, 222
radiopreservation of dried, for control of insect infestation, 130
radiopreservation of, for extended shelf life, 132–33
Flowmeters
design of radiometric deep-water, 208–12
static electricity in anesthetic, radiometric instrument for elimination of, 53
Fluid flow
tracer studies on, 3–24, 337
Fluorescence
nuclear resonance, development of gamma monochromator for studying, 70
Fluorides
determination in water supplies by ^{187}Ta release, 105
Food
(see also Fruits, Grain, Meat, Seafoods, and Vegetables)
analysis of, system for neutron activation, 162
consumption by world population, 127–28
irradiation of, activities of portable ^{137}Cs facility for, 161
irradiation programs for, international coordination of, 163
radiopreservation of, 78–82
radiopreservation abroad, 265–66
radiopreservation of, AEC programs on, 172–74
radiopreservation of, in African countries, 61
radiopreservation of, booklet on services, suppliers, and research in, 264
radiopreservation of, in Canada, program for, 133–34
radiopreservation of, conference on, 83–84
radiopreservation of, dependence of sales of irradiation plants on, 265
radiopreservation of, in Japan, 335
radiopreservation of, by NUMEC, 266
radiopreservation of, role of, in alleviating hunger and malnutrition, 126–36
radiopreservation of, seventh annual AEC contractors' meeting on, 220–24
radiopreservation of, shelf-life and wholesomeness studies on, 223–24
radiopreservation of, in USSR, 84, 163
radiopreservation of, withdrawal of petitions for studying, 263
removal of pesticide residues from, tracer techniques for, 73–74
report on world supply of, 264–65
spoilage of, 129

supplies for world population, solutions for increasing, 128–34
transport of radiopreserved, 231–33
Food irradiation facilities
(see Irradiation facilities)
Forensic science
development of neutron activation analyses for use in, 66
use of activation and x-ray fluorescence analysis in, 171–72
France
preparation of labeled compounds at Saclay, facility for, 340–41
production of radiopharmaceuticals in, for export, 264
production and sales of radioisotopes in, 158–59
Franklin and Marshall College
contract with, for industrial-control measurement of low-level contamination of materials, 71
Freezing
preservation of fish by, IAEA conference on, 160
Fruit flies
(see Insects)
Fruits
(see also Food)
radiation effects on shelf-life extension and quarantine control of tropical, 80
radiopreservation of, 80
radiopreservation of, AEC programs on, 173
radiopreservation of, bibliography on, 25
radiopreservation of, contractors' reports on, 220–22, 224
radiopreservation of, effects of, on spoilage, 130–31
radiopreservation of, portable ^{137}Cs facility for, 289–92
Fuels
(see also Reactor fuels)
evaluation and specifications of, for use in Radioisotope Submersible Engine, 149, 151
Fundamental Methods Associated, Inc.
contract with, for neutron transmutation doping of semiconductors, 71

G

Gages
(see also Altimeters and Thickness Gages)
development of radiometric, 65, 67, 69, 83
development of radiometric, for measuring density and moisture of soils, 251
development of radiometric, for use as cotton spinning machine controller, 219
development of radiometric, for use in metallurgy, 288
development of radiometric, for use with zero-gravity propellants, 286–87
production and sales of radiometric, 180
radiometric, use of ^{85}Kr in airplane oil and zero-gravity propellant, 172
use of radiometric, in industry in various countries, 336–37
Gamma cameras
design and performance of, with image detector, 46–51
Gamma Process Company
construction and operation of radiochemical processing plant, agreement for, 163
Gamma radiation
effects on cod fillets inoculated with type E. Clostridium botulinum, 81–82
effects on heme proteins and myoglobin, 222
polymerization of polyethylene, contract for plant construction for, 266
use for measuring temperature of molten metals, 121–22
use of, for radiation processing, 75
Gamma sources
description of ^{60}Co, for sterilization facility, 144
use of ^{137}Cs, in traveling exhibit, 145–47
Gamma spectrometers
addition of sensors to marine, 68
development of cadmium telluride for use in, 71
Garrett Corp., AiResearch Mfg. Div.
contract with, for studying use of radioisotopes in spacecraft life-support systems, 63
Gas flow
tracer studies on, review on, 3–24
Gases
analysis for moisture by ^{14}C release, 107–8
analysis of stack, for SO_2, 69, 170
Geiger–Mueller counters
use for determining moisture in gases by ^{14}C release, 107–8
General Dynamics Corporation
contract with, for development of neutron activation analysis for use in criminology, 66
General Electric Company
contract with, for research on surface-contoured, semiconductor radiation detectors, 70–71
recovery and sale of ^{238}Pu, 161
General Nucleonics Corporation
contract with, for development of radiometric instrumentation for measurements on aircraft propellants, 65
Generators (thermionic)
research on ^{60}Co, 163
Generators (thermoelectric)
use of radioisotope, in the Antarctic, research on, 163
Glass
mercury flow on, effects of surface roughness on, 116
surface-area measurements on, using labeled surfactant method, 115
Gold
determination in gold ores by X-ray fluorescence, 283
surface-area measurements on, using labeled surfactant method, 114
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Gold-196
half-life, 264
Gold-198
use in hydrology in Australia, 342–44
Gold ores
analysis for gold by X-ray fluorescence, 283
Grain
analysis for proteins, activation, 162
radiopasteurization of, and its products, 79–80
radiosterilization of, for control of insect infestation, 131, 222
Ground waters
analysis for trace elements, activation, 206

H

Halides
(see specific halides)
Handbooks and manuals
"Guide to Services, Suppliers, and Research: Food Irradiation", availability of, 264
publications in "Understanding the Atom" series, 262
on radioisotope production, 62
Hastelloy C
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
Hastelloy X
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
Haynes 25 alloy
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
Haynes 188 alloy
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
Hazleton Labs., Inc.
contract with, for establishing safety of irradiated food products, 78–79
Hazleton-Nuclear Science Corp.
contract with, for radiometric snow-water conservation studies, 67
HD2EHP
(see Phosphoric acid, bis(2-ethylhexyl) esters)
Health physics
(see also Radiation protection)
legal aspects of radiation-safety program for, 54–58
Heart
(see also Artificial heart)
pacemaker for, feasibility of radioisotope-powered, 306–9
pacemaker for, testing of, 82–83
radiodiagnosis of, method for, 147
radioscanning of, using ^{99}Tc and Anger camera, 45, 49
Heat
dissipation in human body by circulatory support system, 308–9
Heat sources
availability of compact radioisotope, 154
design criterions for use in Radioisotope Submersible Engine, 149, 151
production, properties, and shielding of ^{60}Co, 185–94
use of isotopes for, 175–78
use of isotopic, 185
use of ^{238}Pu as, in waste-management system for space vehicles, 242–51
use of ^{147}Pm as, 85
use of radioisotope-fueled, in circulatory support system, 308–12
Heat transfer
in boiler tube in Radioisotope Submersible Engine, 152
Helium
effects on packaging of radiopreserved seafood, 138–39
Hematopoietic system
radiodiagnosis of, 147
High-flux reactors
(see Reactors (high-flux))
High Voltage Engineering Corp.
radiation service and demonstration facility for curing coatings, 162
HMAB (Hexadecyltrimethylammonium bromide)
(see Ammonium compounds (substituted))
Hughes Research Laboratories
contract with, for development of cadmium telluride for use in gamma spectrometer, 71
Hydrocarbons
(see Aromatics and specific compounds)

Hydrogen
detection and measurement using kryptonate technique, 72
determination by tritium release using lithium aluminum tritide, 106
Hydrogen peroxides
HNO_3–H_2O_2, solvent properties for cesium oxides, 101–3
Hydrology
radiometric gage development for use in, 67
use of radioisotopes in, 61
use of radioisotopes in, in Australia, 342–45
use of radioisotopes in, summary of IAEA, 157–58
Hydroquinone
use in preparation of ^{85}Kr-labeled clathrates, 108–9
Hydrospace
use of radioisotopes in, 63

I

IAEA
(see International Atomic Energy Agency)
IIC
(see Isotopes Information Center)
IIT Research Institute
contract with, for demonstration of capabilities of beta-excited x-ray sources, 70
Image detectors
design of, for Anger scintillation camera, 50
Inconel 600
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
India
use of ^{46}Sc in pollution studies in, 348
Indium-113
production and uses of metastable, 182
Industrial Nucleonics Corporation
contract with, for development of aircraft position indicator system, 66
contract with, for development of radiometric gage for measuring SO_2 in stack gases, 69
Industrial water
^{60}Co tracer studies on, 333
Industry
radiation processing of reinforced plastics in, 29–34
research on radiation and radioisotopes, economics of, 266
use of radiation and radioisotopes in Canadian, 257
use of radiation and radioisotopes in Japanese, 335
use of radioisotopes in, 61, 336–40
use of radioisotopes in, in Spain, 260
use of radioisotopes in, summary of IAEA, 157–58
Insecticides
production and use of labeled, in Spain, 259–60
Insects
control of fruit flies using sterile-male technique, 160
control of, use of radiation and radioisotopes in, symposium on, 346
radiosterilization of, in dried fish and grain, 130, 131
radiosterilization of, in grain products, contractors' report on, 222
Inspection and control
equipment for, development of portable radiographic, 125
equipment and methods for, book on radiometric, 118
methods for measurement of low-level contamination, 71
use of radiometric surface-area measurements in, 116
Instrumentation
(see also specific instruments)
design of radiometric, for elimination of static electricity in anesthetic flowmeters, 53
design of radiometric, for mail sorting, 1–2
development of aircraft position indicator system, 66
development of radiometric, for measuring aircraft propellants, 65
development of radiometric, for measuring solubility of cadmium in molten cadmium chloride, 251
development of radiometric, for use in environmental studies, 66–68
development of radiometric, for use in metallurgy, 288
evaluation of radioisotope-excited X-ray fluorescence analysis in criminology, 66
radiometric, contract for testing criteria for, 63
use of radiometric, in research in Canada, 257–58
use of radiometric, in various countries, 336–37
Internal Revenue Service
contract with, for development of neutron activation analyses for use in criminology, 66
International Atomic Energy Agency
use of radioisotopes by, 59–60, 157–58
use of tracer techniques by countries in, 338–40
Intestine
^{59}Fe sorption by, radioscanning of, 49, 50, 52–53
Iodides
solvent properties for cesium, 96
Iodine-123
production and uses of, 182
Iodine-125
use in radiodiagnosis, 147
Iodine-129
use with activation analysis as tracer in biology and medicine, 272–73
Iodine-131
release during determination of dissolved oxygen, 106
release during SO_2 determination in air, 105
use in deep-water flowmeters for measuring current velocity, 208–12
use in hydrology in Australia, 342–43
Ionization detectors
development of, for methane detection in coal mines, 67
Iridium-192
use as gamma source in portable radiographic device, 125
Iron
surface-area measurements on, using labeled surfactant method, 114
Iron-52
sorption by intestine, radioscanning of, 49, 50, 52–53
Iron-55
half-life, 264
Iron-58
use with activation analysis as tracer in biology and medicine, 271–72
Iron compounds
analysis of, by Moessbauer spectrometry, 72
Iron oxides
determination in cement raw mix by X-ray fluorescence, 283
Irradiated Foods, Inc.
contract with, for design of meat-irradiation pilot plant, 83
Irradiation facilities
activities of portable ^{137}Cs, for food in traveling exhibit, 161
availability and performance of Gamma-beam 650, 147
bearings for MPDI, replacement of, 25–28
dedication of Hawaii development irradiator, 83
description and operation of portable ^{137}Cs, for food, 289–92
design of ^{60}Co, for meat, economics of, 192–93
design of ^{60}Co, for sterilization of medical supplies, 142–45
design and economics of ^{60}Co, for sterilization of medical supplies, 234–41
design of KP-140 ^{60}Co, 59–60
design of meat, contract for, 83
design of Oregon State Univ. Radiation Center, 299–302
development for food preservation studies, 173–74
development of portable, using ^{192}Ir, 125
installation of gamma, for medical supplies, 348
for medical supplies in Canadian hospital, 348
for medical supplies, list of, 305
operation of food, at Newfield Products Ltd., by AECL, 84
operation of MPDI, 230–31
for preservation of foods, 220–23
proposals for ^{137}Cs food, 349
sales of, dependence of food irradiation on, 265
use of ^{137}Cs mobile, in traveling exhibit, 145–47
use of portable shipboard, for radiopreservation of shellfish, 81
Isotopes
(see also Radioisotopes and Stable isotopes)
book: "Isotope Index", 8th Ed., 164
information on, IIC bibliography on special sources of, 162
publication of "Isotope News" in Sweden, 159
research on, economics of industrial, 266
special sources of information on, IIC bibliography on, 162
use for heating suits for air force, feasibility of, 163
Isotopes Information Center (IIC)
accessions of, 266–67
bibliography on special sources of information on isotopes, 4th Rev., 162
publications of, list of, 164–65
publication of list of radioisotope customers for FY 1967, 349
Italy
petition of government of, for irradiation of potatoes for inhibition of sprouting, 163–64
reports from, 85–86

J

Japan
nuclear medicine in, 252–54
use of radiation and radioisotopes in, program for, 334–36

K

Kaman Aircraft Corporation
contract with, for development of liquid loop for activation analysis, 72
Kaman Nuclear
development of neutron activation food-analysis system, 162
Kidneys
radiation synthesis of membranes of artificial, 77
radiodiagnosis of, method for, 147
radioscanning of, with anger camera, 53
Krypton-85
development of, as universal tracer, 73
incorporation in clathrates, 108–9
use in clathrates for determining O_3 and SO_2 in upper atmosphere, 109–11
use in continuous nuclear oil gaging system and zero-gravity propellant gage, 172
use in taxi guidance system, 348
use as tracer for measuring ventilation rates, 278–79
use in zero-gravity propellant gage, 286–87

L

Labeled compounds
preparation of, Saclay facility for, 340–41
production at Lucas Heights, Australia, 195–97
production of, in Czechoslovakia, 155–57
production of, in Spain, 259
Laboratories
mobile, for teaching radioisotope techniques and uses, 262
for Oregon State Univ. Radiation Center, 301–2
Laminates
(see Plastics)
Lamont Geological Observatory
contract with, for alpha spectrometric measurement of natural radioactivity, 70
Lanthanum
use with activation analysis as tracer in stream pollution studies, 276
Lasers
preparation of, use of nuclear radiation for, 76–77
Lead
analysis of white, for trace components, activation, 288
design and fabrication of shield of, for scintillation detector, 207–8
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Leaks
tracer studies on, in various countries, 338
Licenses
conditions for radioisotope, inspection and enforcement of AEC, 326–27
radioisotope, report of review panel on, 315–31
Life sciences
trace element research in, using activation analysis, 200–6
tracer techniques in, using stable elements and isotopes with activation analysis, 270–75
use of radiation and radioisotopes in, in Japan, 335
Life-support systems
feasibility of radioisotope-powered blood pump for human implantation, 306–12
use of radioisotopes in spacecraft, 63–65
Light sources
use of ^{36}Cl as, in photometer, 172
Linear accelerators
use of, in radiation curing of reinforced plastics, 29–34
use for studies on curing coatings, 162
Lipids
radiation effects on fish, 222
Lithium
thickness of molten, for measuring temperture by radiation transmission from ^{60}Co, 122
Lithium aluminum hydrides
use of tritium-labeled, in determination of hydrogen by tritium release, 106
Liver
radioscanning of, using ^{131}I and Anger camera, 49
Lockheed-Georgia Company
contract with, for evaluation of radiation processed plastic-wood materials, 77
Lockheed Missiles and Space Company
contract with, for studying radioisotopes in spacecraft life-support systems, 64
Loops
development of liquid, for activation analysis, 72
Louisiana State University
contract with, for commercial irradiation of shellfish using portable shipboard irradiator, 81
contract with, for radiopreservation of shrimp and oysters, 82
Lubrication
tracer studies on, in various countries, 337
Luminescence
production of, by radioisotopes, 73

M

Magnesium
thickness of molten, for measuring temperture by radiation transmission from ^{60}Co, 122
Mail
apparatus for sorting, design of radiometric, 1–2
Mallinckrodt Nuclear
contract for using University of Missouri reactor, 263–64
Manhattan-99
brand name for radioinduced wood–plastic composites, 348
Manuals
(see Handbooks and manuals)
Marine products
(see Seafood)
Marine Products Development Irradiator
(see Irradiation facilities)
Marine Radioactivity Laboratory
contract with, for construction of low-background beta detector for assay of solid samples, 72
Massachusetts Institute of Technology
contract with, for research on gamma radiation effects on cod fillets inoculated with type E, Clostridium botulinum, 81–82
Meats
radiation effects on bacteria in, 222–23
radiopasteurization of, economics of, 79
radiopreservation of bacon for use by Air Force and Army, 84–85
radiopreservation of, contractors' reports on, 221–24
radiopreservation of, design and economics of ^{60}Co facility for, 292–98
radiosterilization of viruses in, 131
Medical supplies
radiosterilization of, Canadian hospital facility for, 348
radiosterilization of, conference on, 84, 303–5
radiosterilization of, design of ^{60}Co irradiation facility for, 142–45
radiosterilization of, design and economics of ^{60}Co facilities for, 234–41
radiosterilization of, German facility for, 348
Medicine
conference on medical physics, August 1969, 261
developments in nuclear, in Japan, 252–54
tracer techniques in, using stable elements and isotopes with activation analysis, 270–75
use of activation analysis in trace element research in, 200–1
use of labeled compounds in, report of review panel on licensing, 324–26
use of radiation and radioisotopes in Canadian, 258
use of radiation and radioisotopes in Japanese, 334–35
use of radioisotopes in, 61
use of radioisotopes in diagnosis, 147
use of radioisotopes for diagnosis in, licensing procedures for, 162
use of radioisotopes in, summary of IAEA, 157–58
Melpar, Inc.
contract with, for development of methane ionization detector for use in coal mines, 67
Melting point
measurement of, using alpha particles, 123
Membranes
radiation synthesis of artificial kidney, 77
Mercury
flow on glass, effects of surface roughness on, 116
Mercury-197
use in radiodiagnosis, 147
Mercury-203
use in radiodiagnosis of brain tumors, 49
Metallurgy
gages for use in, development of radiometric, 288
Metals
determination of trace heavy, in pharmaceuticals, activation, 203–4
measurements on, use of surface-roughness data for, 115–16
surface-area and roughness measurements on, using radioisotopes, 112–17
temperature of molten, radioisotopic method for measuring, 121–22
thickness of hot-rolled, use of radiometric gages for measuring, 125
Meters
(see also Flowmeters)
Methane
detection in coal mines, 67
Methane, nitro-
safety considerations in working with, 99–100
Michigan State University
contract with, for radiopasteurization of fresh meats, 79
contract with, for research on radiopreservation of fruits and vegetables, 80
Microorganisms
effects on spoilage of radiopreserved

seafood, effects of storage conditions on, 139–40
radiation effects on, surviving in pasteurized seafoods, 80–81
Mineral deposits
delineation and characterization of marine, tracer techniques for, 68
Minerals
exploration of, development of radiometric system for, 67
Mines
analysis for methane in, 67
water flow in gold, ^{60}Co tracer studies on, 332–33
MISER (Microbiological Inhibition Systems Employing Radiation)
survey of potential applications of, 75
Moessbauer effect
use of, for analysis of iron compounds, 72
Moisture
determination in gases by ^{14}C release, 107–8
measurement in soils, radiometric, 251
Molding compounds
electron-beam curing of commercial, 33
Monitoring
for radiation in ^{60}Co irradiation facility, 142, 144
Monochromators
development of, for studying nuclear resonance fluorescence, 70
Monomers
radioinduced polymerization of unusual, 77–78
Motion pictures
availability of, on atomic energy, 347–48
availability of "Atomic Power Today", 164
MPDI (Marine Products Development Irradiator)
(see Irradiation facilities)
Mutations
radioinduced in peanut plant, 85
radioinduced in plants by seed exposure, meetings on, 313–14
Myoglobin
radiation effects on structure of, γ, 222

N

National Bureau of Standards
prices for standard reference materials, 263
National Canners Association
contract with, for research on tracer techniques for removal of pesticide residues from food, 73–74
Natural waters
analysis for dichromate and vanadate ions by ^{110}Ag release, 107
Naval Oceanographic Office
contract with, for evaluation of tracer techniques in oceanography, 68
NBS
(see National Bureau of Standards)
Neutron activation analysis
(see Activation analysis)
Neutron Products, Inc.
production of ^{60}Co in private power reactor, 161
Neutron sources
evaluation of, for radiography, 216–18
use at Oregon State Univ. Radiation Center, 301
for use in radiography, 219
Neutrons
effects on mutation induction in plants by seed exposure, meetings on, 313–14
effects on restoration of photographs, 125
energy ranges of, for use in radiography, 215–16
use in radiography, conference at Saclay, France on, 219
New England Nuclear Corporation
expansion by, 348
Newfield Products Ltd.
operation of food irradiation plant at, by AECL, 84
Newsletter
on neutron radiography, 266
Nickel
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
surface-area measurements on, using labeled surfactant method, 114
Nitric acid
HNO_3–H_2O_2, solvent properties for cesium oxide, 101–3
Nitrogen
effects on packaging of radiopreserved seafood, 138–39
North Carolina State University
contract with, for research on radioinduced ionic polymerization, 75–76
Nuclear Materials and Equipment Corporation (NUMEC)
contract with, for operation of boron isotope separation plant, extension of, 161–62
development of irradiated wood-plastic composite, 349
radiation processing of food by, 266
testing of cardiac pacemaker, 82–83
Nuclear Science and Engineering Corporation
contract with, for evaluation of radiometric systems for measuring SO_2 in stack gases, 69
contract with, for Moessbauer spectrometry for analysis of iron compounds, 72
NUMEC
(see Nuclear Materials and Equipment Corporation)
Nutrition
use of activation analysis in trace element research in, 201

O

Oak Ridge National Laboratory
availability of radioisotopes, catalog on, 85
radioisotope sales by, 262
stable-isotope inventory at, 84, 160, 263, 347
stable isotope shipments by, 1946–1966, 160–61
Oceanography
(see also Tracer techniques (oceanography))
current velocity studies in, design of radiometric deep-water flowmeters for, 210–12
Oregon State University
contract with, for research on radiation effects on microbial flora surviving in pasteurized seafoods, 80–81
Radiation Center at, design of, 299–302
Organic compounds
(see also Labeled compounds)
radioinduced polymerization of, with tetrafluoroethylene, 78
ORNL
(see Oak Ridge National Laboratory)
Oxygen
determination of dissolved, in fresh water and seawater by ^{204}Tl release, 106–7
determination of dissolved, by ^{131}I release, 106
Oxygen-18
use with activation analysis as tracer in biology and medicine, 273–75
Ozone
determination in upper atmosphere using ^{85}Kr-labeled clathrates, 109–10

P

Packaging
effects on storage of radiopreserved seafood, 136–39
of radioactive materials, Second International Symposium on, 346
Panametrics, Inc.
contract with, for development of hydrogen detector using kryptonate technique, 72
contract with, for development of isotopic altimeter-setting indication system, 66
contract with, for development of ^{85}Kr as universal tracer, 73
contract with, for evaluation of radioisotope-excited X-ray fluorescence methods for, 68
contract with, for production of monoenergetic X-rays by alpha radiation, 70
Patents
method for production of high-specific-activity ^{137}Cs, 103
Pebble-bed reactors
(see Reactors (Pebble-Bed))
Permalloy
magnetic properties of thin films of, effects of surface roughness on, 116
Personnel
reorganization of atomic energy, in Red China, 61–62
Pesticides
removal of, from food, tracer techniques for, 73–74
Petroleum
refinery flow and leak rates, ^{60}Co tracer studies on, 333
Pharmaceuticals
analysis for trace heavy metals, activation, 203–4
Phenol, 4-chloro-2-benzyl-
solvent properties for Cs, 97
Phenol, 4-chloro-2-phenyl-
solvent properties for Cs, 97
Phenol, 4-sec-butyl-2(α-methylbenzyl)-
solvent properties for Cs, 97, 98, 100
Phenol, o-phenyl-
solvent properties for Cs, 97
Philippine Island
industrial use of radioisotopes in, 332–34
Phosphoric acid, bis(2-ethylhexyl) esters
solvent properties for Cs, 98
Phosphorus-33
production and uses of, 182
Photochemistry
(see Ultraviolet radiation)
Photography
restoration of photographs by neutron activation, 125
Photometers
use of ^{36}Cl as light source in, 172
Pillsbury Company
contract with, for research on commercial storageability of irradiated potatoes, 80
Plants
radioinduced mutations in peanut, 85
radioinduced mutations in, by seed exposure, meetings on neutron, 313–14

Plastics
plastic–wood, radioinduced composites of, 348–49
properties of benzoyl peroxide–cured reinforced laminated, 31
properties of electron-beam–cured reinforced laminated, 31, 32
radiation curing of reinforced, commercial, 29–34
radioinduced polymerization with wood, 77
Plutonium
fabrication at Hanford, decision on plant for, 266
Plutonium–238
properties for use as heat source in circulatory support system, 310
recovery and sale of, by General Electric, 161
use as heat source in waste-management system for aerospace, 242–51
Pollution
(see also Atmosphere)
control of, use of radioisotopes in, 69
tracer studies on dispersion of, in various countries, 338
tracer techniques in, using stable elements and isotopes with activation analysis, 275–76
use of ^{46}Sc in studies on, in India, 348
Polymerization
radioinduced emulsion, 78
radioinduced ionic, 75–76
Populations
food consumption by world, problems in, 126–28
Positron cameras
(see Electron cameras)
Potassium
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Potatoes
(see Vegetables)
Powders
melting point of, radiometric method for measuring, 123
Power generators
use of isotopes in, 175–78, 181
Power reactors
(see Reactors (power))
Power sources
(see also Heat sources)
development of isotopic, by ENEA, 85
feasibility of radioisotopic, for human implantation, 306–12
use of radioisotopes for, 63–65
use of ^{170}Tm as fuel for, contract for studies on, 347
Prepreg
(see Plastics)
Promethium–147
properties for use as heat source in circulatory support system, 310–12
use of, as heat source, 85
use in space thruster, 347
Propellants
gage for, development of radiometric, 65
gage for, development of zero-gravity, using ^{85}Kr, 172, 286–87
Proteins
determination in grains, activation, 162
radiation effects on blood, γ, 222
Publications
list of AEC radioisotope customers for FY 1967 by IIC, 349
list of IIC, 164–65
miscellaneous, 165–66
Pulse generators (electronics)
testing of, for treatment of heart block by NUMEC, 82–83
Pumps
evaluation of, for use in Radioisotope Submersible Engine, 153
water flow in, development of radiometric instrument for measuring, 66
Purex wastes
solvent extraction of Cs from, using dipicrylamine, 94–95

R

Radiation
(see also Gamma radiation, Radiation sources, and X radiation)
effects on bacteria in meats and seafoods, 222–23
effects of colloids, 78
effects on density and hardness of Co, 186
effects on fish lipids, 222
effects on microbial flora surviving in pasteurized seafoods, 80–81
effects on mutation induction in peanut plant, 85
polymerization of tetrafluoroethylene with organic compounds, 78
polymerization of unusual monomers, 77–78
process application for, 175
research on, economics of industrial, 266
synthesis of artificial kidney membranes, 77
technology, developments in USA in 1967, 169–84
use in industry, medicine, and research in Canada, 255–58
use for insect control, symposium on, 346
use in Japan, program for, 334–36
use for preparation of optical laser materials, 76–77
use for production of wood–plastic composites, 348–49
use for sewage treatment, contract for studying, 264
Radiation chemistry
developments in AEC programs on, 174–75
in Japan, 335
Radiation detectors
development of, 70–71, 73
neutron transmutation doping of, 71
use in Japan in nuclear medicine, 253
Radiation detectors (bubble chamber)
development for low-level counting, 73
Radiation detectors (scintillation)
shield for, design and fabrication of low-background, 207–8
use for measuring temperature of molten metal using ^{60}Co, 122
Radiation detectors (semiconductor)
research on surface-contoured, 70–71
Radiation Dynamics, Inc.
contract for installing 300-kev Dynacote particle accelerator, 162
financing of, 162
Radiation injuries
litigation on, 54–58
Radioactive materials
regulation of, by Colorado, 262–63
Radiation preservation
(see Radiopreservation and Radiosterilization)
Radiation processing
curing of reinforced plastics by, commercial, 29–34
developments in, 75–78
equipment for, 30, 31
of industrial materials, 180–81
of sewage, contract for, 348–49
Radiation protection
(see also Health physics)
problems in, using radiometric instruments, 288
safety standards for, IAEA Safety Series No. 9, 159
standards for, report of review panel on, 317–19
Radiation sources
for chlorination of aromatics, external and internal, 41, 42
design of, for use in mail-sorting apparatus, 1–2
production of, in Czechoslovakia, 155–57
production and sales of, 180
safety of sealed, program on, 169
sales and uses of, in USA in 1967, 178–83
use in engineering studies, 175
Radioactive contamination
measurement of low-level, for industrial control, 71
Radioactive materials
packaging of, Second International Symposium on, 346
safety standards for, IAEA Safety Series No. 9, 159
Radioactive waste
separation of Cs from, 92–101
tracer studies on, in India, 348
Radioactivity
measurement of natural, by alpha spectrometry, 70
use of natural, in soils for measuring snow-water reserves, 212–13
Radiochemical analysis
method for, exchange, 104–12
Radiochemical processing plants
construction and operation of, agreement for, 163
operation of Hanford, contract for, 82
production and sales of, 180
Radiochemistry
facilities and program for, at Traceriab Western Division, 123–24
Radiodiagnosis
licensing procedures for medical, 162
use of Anger camera in, 45–53
of various diseases, 147
Radiography
conference on neutron, Saclay, France, 219
development of neutron, in France, 214–18
equipment for, development of portable, 125
licensing for industrial, report of review panel on, 323–24
neutron, newsletter on, 266
neutron sources for, 219
thermal neutron, methods for photographic detection in, 216
Radioisotope cameras
(see Anger camera and Electron camera)
Radioisotope Submersible Engine (RISE)
design criterions for, 148–54
fuels for, 149, 151
Radioisotopes
(see also specific radioisotopes and Tracer techniques)
applications development, contracts for, 65–74
availability of ORNL, catalog on, 85
book: "Table of Isotopes", 85
book: "The World of Radioisotopes", review, 62
courses on, fees for AEC, 261–62
courses in techniques and uses of, mobile laboratory for teaching, 262
determinations at Traceriab, 124
developments in USA in 1967, 169–84

exportation of, as labeled compounds by Soviet-Bloc countries, AEC general license for, 82
half-life determination by Tracerlab, 124
"Isotope Index", 8th Ed., 164
licensing procedures for use of, in medical diagnosis, 162
licensing and regulation of use of, report of review panel on, 315–31
production of, AEC withdrawal from, 347
production of, in Czechoslovakia, 155–57
production and distribution of, in Japan, 335–36
production of, facilities for material flow in, 199
production and import of, in Japan, 253
production at Lucas Heights, Australia, program for, 194–99
production of, manual on, 62
production and marketing of, prediction of, for 1980, 89–91
production and sales of, 178–81
production and sales of, in France, 158–59
production and shipments of, in Canada, 255–56
production of transplutonium, use of high flux reactors for, 182–83
production and use of new, 182
production and use of, in Spain, 1964–1965, 258–60
sales by AEC, 261
sales by ORNL, 262
shipping regulations for, economics of, 261
standards for 93, table of availability of, 118–21
testing short-lived, for brain scanning, 261
thermal applications, contracts for, 63–65
tracer uses of, with Anger camera, 45, 49–53
use in agriculture, 60–61
use in chemistry, 234
use in compact heat sources, 154
use in engineering, 118
use in food preservation, 61
use as heat sources and power generators, 175–78
use in hydrology, 61
use in hydrology in Australia, safety in, 342–45
use in IAEA-member countries of Africa, 60–61
use by IAEA in various fields, 157–58
use in industry, 61, 336–40
use in industry, medicine, and research in Canada, 255–58
use in industry in Philippines, 332–34
use for insect control, symposium on, 346
use in instruments for environmental studies, 66–68
use in Japan, program for, 334–36
use in medicine, 61, 147
use in medicine in Japan, 252–54
use in pollution process control, 69
use as power system in artificial hearts, 178
use for production of luminescence, 73
use in spacecraft life-support systems, 63–65
use for surface-area and roughness measurements on metals, 112–17
use as tracers in fluid flow systems for process control, 3–24
Radiopharmaceuticals
effects on body tissues, 261
production in France for export, 264
production and import of, in Japan, 253
production at Lucas Heights, Australia, 195–97
production and sales of, 180
production and use of, in Spain, 259–60
Radiopreservation
of bacon for use by Airforce and Army, 84–85
of dried fish for control of insect infestation, 130
of fish for extended shelf life, 132–33
of fish, IAEA conference on, 160
of foods, 78–82, 266
of foods abroad, 265–66
of foods, AEC programs on, 172–74
of foods in African countries, 61
of foods, booklet on services, suppliers, and research in, 264
of foods in Canada, program for, 133–34
of foods, conference on, 83–84
of foods, contractors' reports on, 220–24
of foods, description of portable ^{137}Cs facility for, 289–92
of foods, facility for, 173–74
of foods, international coordination of programs for, 163
of foods in Japan, 335
of foods by NUMEC, 266
of foods, role of, in alleviating hunger and malnutrition, 126–36
of foods, shelf-life and wholesomeness studies on, 223–24
of foods in Soviet Union, 84
of foods in USSR, developments in, 163
of foods, withdrawal of petitions for studying, 263
of meats, design and economics of ^{60}Co facility for, 292–98
of Pacific coast fisheries products, 136–41
of potatoes for sprouting inhibition, petition of Italian government for, 163–64
of seafood, dosage in, 136
of seafood, packaging studies on, 138–39
of seafood, shelf-life and wholesomeness studies on, 224–33
of seafood, survival of microbial flora during, 234
of shellfish, commercial, 81
Radioptics, Inc.
contract with, for use of nuclear radiation in preparation of optical laser materials, 76–77
Radiosterilization
(see also Radiopreservation)
of fruit flies, 160
of insects in grain, 131, 222
of medical supplies, conference on, 303–5
of medical supplies, design of ^{60}Co facility for, 152–45, 234–41
of medical supplies, installation of German facility for, 348
of viruses in infected animals, 131
RAI Research Corp.
contract with, for radioinduced polymerization of tetrafluoroethylene with organic compounds, 78
Rankine cycle power systems
use in Radioisotope Submersible Engine, 148–54
Rare earths
determination of traces of, in bone ash, 203
Reaction mechanisms
for photochemical and radioinduced chlorination of aromatics, 39, 40
Reactor fuel elements
separation of ^{244}Cm from spent, at Hanford, 347
Reactor fuels
processing for ^{137}Cs recovery, 92
processing plant at Hanford for, contract for operation of, 82
Reactors (high-flux)
use for producing transplutonium isotopes, 182–83
Reactors (Pebble-Bed)
development of, for chemical processing, 76
Reactors (power)
production of ^{60}Co in private, by Neutron Products, Inc., 161
Reactors (research)
use in Oregon State Univ. Radiation Center, 301
use of University of Missouri, by Mallinckrodt Nuclear, contract for, 263–64
Red China
reorganization of peaceful nuclear service in, 61–62
Regenerators
description of, for use in Radioisotope Submersible Engine, 153
Rensselaer Polytechnic Institute
contract with, for research on radioisotope-excited light-source techniques, 73
Research
use of radiation and radioisotopes in Canadian, 257–58
Research Triangle Institute
contract with, for radioinduced emulsion polymerization, 78
contract with, for radioinduced polymerization of unusual monomers, 77–78
contract with, for research on mechanical and physical properties of wood-plastic combinations, 77
Reservoirs
leakage in, tracer techniques for investigating, 67
RIPPLE (Radioactive Isotope Powered Pulsed Light Equipment - United Kingdom)
development of new series in, 349
RISE
(see Radioisotope Submersible Engine (RISE))
Ruthenium-106
use in deep-water flowmeters for measuring current velocity, 208–12

S

Safety
(see also Radiation protection)
considerations in working with nitrobenzene, 99–100
in nuclear installations, legal aspects of, 54–56
procedures for, in ^{60}Co irradiation facility, 145
regulations for handling radioactive materials in Colorado, 262–63
standards for radiation protection, IAEA Safety Series, No. 9, 159
in using radioisotopes in Australia, 344–45
Salmonella
(see Bacteria)
Sand
movement on beaches, tracer studies on, 171
Sanders Nuclear Corp.
contract for research on feasibility of isotopically heated suit for air force, 163

contract for studies on use of ^{170}Tm as fuel for isotope power source, 347
Satellites
sixth anniversary for navigational, 83
Scandium-46
use in pollution studies in India, 348
Scintillation cameras
(see Anger camera)
Scintillation crystals
for Anger scintillation camera, 46–51
Scintillation detectors
(see Radiation detectors (scintillation))
Seafoods
radiation effects on bacteria in, 222–23
radiation effects on cod fillets inoculated with type E, Clostridium botulinum, γ, 81–82
radiopreservation of, AEC programs on, 173
radiopreservation of, contractors' reports on, 221–24
radiopreservation of, dosage in, 136
radiopreservation of, effects of, on quality, 140–41
radiopreservation of Pacific coast, 136–41
radiopreservation of Pacific Crab and flounder, 81
radiopreservation of, packaging studies on, 138–39
radiopreservation of shrimp and oysters, 82
radiopreservation of, shelf-life and wholesomeness studies on, 132–33, 224–33
radiopreservation of, survival of microbial flora during, 80–81, 234
radiopreservation of, using MPDI, 81
radiopreservation of, using portable shipboard irradiator, 81
Seawater
analysis for dissolved oxygen by ^{204}Tl release, 106–7
Sediments
(see Silts)
Seeds
radiation effects on mutation induction in plants by exposure to, meetings on, 313–14
Semiconductors
(see also Radiation detectors (semiconductor))
doping of, neutron transmutation, 71
Sensors
addition to marine gamma spectrometers, 65
Sewage
radiation processing of, contract for, 264, 348–49
tracer studies on, in Australia, 342
Shielding
for ^{137}Cs mobile irradiation facility, 145
for ^{60}Co irradiation facility, 142
design for Radioisotope Submersible Engine, 151–52
Shields
design and fabrication of low-background, for scintillation detector, 207–8
Shipping
of radiopreserved foods, 79
Silicon oxides
surface-area measurements on, comparison of B.E.T. and labeled surfactant methods for, 115
Silts
movement in harbors, oceans, and rivers in Australia, tracer studies on, 343–44
Silver
determination in silver ores by x-ray fluorescence, 283–84
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Silver-110
release during determination of dichromate and vanadate ions in natural waters, 107
Silver ores
analysis for silver by X-ray fluorescence, 283–84
Snow
conservation studies on, radiometric, 67
water equivalent of, use of natural soil radioactivity for measuring, 212–13
Sodium
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Sodium iodides
crystals of, for use in radioisotope cameras, 46–50
Sodium phosphates
effects on radiopasteurized seafood, 139
Sodium tetraphenylborates
solvent properties for Cs, 95–96
Soils
density and moisture of, radiometric gage for measuring, 251
properties of, use of neutron activation analysis for studying, 204–6
radioactivity of, measurement of snow-water reserves by natural, 212–13
Solids
analysis for radioisotopes, development of beta detector for, 71–72
flow of, review of tracer studies on, 16–17
Soviet Union
radiopreservation of foods in, 84, 163
Space
(see Aerospace)
Space Technology Laboratories, Inc.
contract with, for instrumentation development for spacecraft propellant gaging, 65
Space vehicles
life-support systems for, use of radioisotopes in, 63–65
thruster for, development of ^{147}Pm-heated, 347
waste-management system for, 242–51
Spain
production and use of radioisotopes in, 1964–1965, 258–60
Stable isotopes
inventory of, at ORNL, 84, 160, 263, 347
shipments by ORNL, 1946–1966, 160–61
use of activable, as tracers, 269–77
Stack disposal
analysis of gases in, SO_2 methods for, 69, 83, 170
Standard reference materials
prices for, National Bureau of Standards, 263
Stanford Research Institute
research on use of radioisotope thermoelectric generators in the Antarctic, 163
Storage
of food, effects of radiopreservation on, 80, 132–33
of irradiated potatoes, commercial, 80
Streams
pollution of, tracer studies on, using stable elements and isotopes with activation analysis, 276
pollution of, tracer techniques for controlling, 69
Stress analysis
use of isotopic x-ray sources for, 70
Strontium-84
use with activation analysis as tracer in biology and medicine, 272
Sulfur
determination in coal by X-ray fluorescence, 282–83
Sulfur dioxides
determination in air by ^{36}Cl release, 105
determination in air by ^{131}I release, 105
determination of, in stack gases, development of radiometric gage for, 69, 83
determination in upper atmosphere using ^{85}Kr-labeled clathrates, 110
pollution in atmosphere, 170
Sulfur isotopes
use as tracer in stack gas analysis for SO_2, 170
Surface waters
current velocity of, design of radiometric deep-water flowmeters for measuring, 208–12
pollution by industrial plants, 170
tracer studies on silt movement in Australian, 343–44
Surfaces
measurements on area and roughness of, using radioisotopes for, 112–17
roughness measurements on, uses of, 115–16
Systems for Nuclear Auxiliary Power (SNAP)
use of radioisotope thermoelectric tors in, 176–77

T

Tantalum-182
release during fluoride determination in water supplies, 105
TD-nickel
properties of chromium-containing, for use as encapsulating material for ^{60}Co heat sources, 190–93
properties for use as encapsulating material for ^{60}Co heat sources, 190–93
Technetium-99
use in radiodiagnosis, 147
tracer use of, in radioscanning, 45, 49, 51
Teledyne Company
acquisition of Controls for Radiation, Inc., 264
Temperature
of molten metals, radioisotopic method for measuring, 121–22
Tetrafluoroethylene
(see Ethylene, tetrafluoro-)
Texas A and M Research Foundation
contract with, for computer-coupled activation analysis, 73
contract with, for development of gamma monochromator for study of nuclear resonance fluorescence, 70
Texas Nuclear Corporation
contract with, for development of x-ray measuring techniques, 70
contract with, for evaluation of radiometric systems for measuring SO_2 in stack gases, 83
contract with, for research on neutron activation for process control, 72
Thallium-204
release during determination of dissolved oxygen in fresh water and seawater, 106–7
Thermal energy
(see Power sources)
Thermal neutrons
use for radiography, developments in France on, 214–18

Thermionic generator
(see Generators (thermionic))
Thermo Electron Engineering Corp.
contract with, for design of implantable power source for circulatory support systems, 64
contract for research on ^{60}Co thermionic generator, 163
Thermoelectric generators
(see Generators (thermoelectric))
Thickness gages
development of radiometric, for hot-strip mills, 24
development of radiometric, for measuring eggshell strength, 284–86
use of radiometric, for hot-rolled metals, 125
use of radiometric, in industry in various countries, 336
Thulium-170
use as fuel for isotope power sources, contract for studies on, 347
Thulium-171
properties for use as heat source in circulatory support system, 312
Thyroid
radioscanning of, using ^{131}I and Anger camera, 49
Thyroid gland
radiodiagnosis of diseases of, 147
Tin
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Tissues
analysis of animal, for trace elements, activation, 203
effects of radiopharmaceuticals on human, 261
Titanium oxides
surface-area measurements on, comparison of B.E.T. and labeled surfactant methods for, 115
Titrations
book: Radiometric Titrations", 112
Toluene
radioinduced chlorination of, 34–35, 37–38
Tools
development of, for replacing underwater bearings in MPDI source-elevator, 26–28
Tracer techniques
for measuring ventilation rates, 278–80
use of activable stable elements and isotopes with activation analysis in, 269–77
use in industry in various countries, 337–38
use in pollution studies, 170
Tracer techniques (chemical engineering)
for fluid flow systems for process control, 3–24
Tracer techniques (chemistry)
developments in radio-release, review on, 104–12
for removal of pesticide residues from food, 73–74
Tracer techniques (geophysics)
development of, for natural-gas operations, 67
Tracer techniques (hydrology)
development of, for investigating reservoir leakage, 67
Tracer techniques (life sciences)
use of activation analysis with, 200–6
Tracer techniques (medicine), 45, 46, 49–53
Tracer techniques (oceanography)
development of, 68–69
Tracerlab
radiochemical facilities and program at Western Division of, 123–24
Tritium
release during hydrogen determination using lithium aluminum tritide, 106
use in hydrology in Australia, 342, 344
Tulane University
contract with, for testing use of short-lived radioisotopes for brain scanning, 261
Tumors
radiodiagnosis of, using Anger camera, 45, 49
Turbines
design for use in energy conversion system for Radioisotope Submersible Engine, 153
water flow in, development of radiometric instrument for measuring, 66

U

Ultraviolet radiation
effects on chlorination of aromatics, 35–41
Underwriters' laboratories
contract with, for isotope device safety testing program, 63
Unidynamics
contract with, for research on radiation effects on colloids, 78
University of California
contract with, for research on shelf life of irradiated fruits and vegetables, 80
University of Florida
contract with, for research on radiopreservation of foods, 79
University of Hawaii
contract with, for research on shelf-life extension and quarantine control of irradiated tropical fruits, 80
University of Miami
contract with, for studying effects of radiopharmaceuticals on body tissues, 261
Urine
collection and waste-management systems for, in space vehicles, 243–51
U. S. Army
contract with, for development of tracer techniques in oceanography, 68–69
U. S. Department of Agriculture
contract with, for development of radiometric gages, 67
contract with, for radiopreservation of grain and grain products, 79–80
U. S. Department of Commerce
contract with, for electron and γ- and X-ray research for radiation process, 75
contract with, for evaluating commercial prospects of radiopreserved foods, 79
U. S. Department of the Interior
contract with, for delineation and characterization of marine mineral deposits, 68
contract with, for development of tracer system for natural gas operations, 67
contract with, for radiopasteurization of fishery products using MPDI, 81
contract with, for radiopreservation of Pacific crab and flounder, 81
contract with, for research on commercial shipping of radiopreserved foods, 79
U. S. Geological Survey
contract with, for development of radiometric mineral exploration system, 67
U. S. Naval Ordnance Laboratory
contract with, for addition of sensors to marine gamma spectrometer, 68
USSR
(see Soviet Union)

V

Vanadates
determination in natural waters by ^{110}Ag release, 107
Vegetables
(see also Food)
radiation effects on shelf life of, 80
radiopreservation of, bibliography on, 25
radiopreservation of, contractors' reports on, 220–22
radiopreservation of, description of portable ^{137}Cs facility for, 289–92
radiopreservation of, effects of, on spoilage, 130–31
radiopreservation of potatoes for sprouting inhibition, 163–64
storageability of irradiated, commercial, 80
Vegetation
properties of, use of neutron activation analysis for studying, 204–6
Ventilation
for ^{60}Co irradiation facility, 144–45
rate measurements on, tracer techniques for, 278–80
tracer studies on, in various countries, 338
Viruses
radiosterilization of, in carcasses of infected animals, 131

W

Washington State University
contract with, for development of tracer techniques in stream-pollution control, 69
Waste solutions
(see Radioactive wastes)
Wastes
management system for recovery of water from human, during space flight, 242–51
Water
(see also Ground waters, Industrial water, Natural waters, and Surface waters)
analysis for dissolved oxygen by ^{204}Tl release, 106–7
conservation studies on, radiometric, 67
content in soils, development of radiometric gage for measuring, 251
equivalent in snow cover, use of natural soil radioactivity for measuring, 212–13
flow in gold mine, ^{60}Co tracer studies on, 332–33
recovery from human urine during space flight, processing system for, 242–51
pollution by industrial plants, studies on, 170
Water supplies
analysis for fluoride by ^{182}Ta release, 105
West Virginia University
contract with, for radiation processing of wood–plastic combinations, 77
Western New York Nuclear Research Center, Inc.
contract with, for development of radioactive pebble-bed chemical reactor system, 76
Westinghouse Electric Corp.
contract with, for design of implantable power source for circulatory support systems, 64
William H. Johnston Laboratories, Inc.
contract with, for development of bubble chambers for low-level counting, 73

contract with, for vectored research on promising radiation systems, 75
Wood
wood–plastic, radioinduced composites of, 348–49
radioinduced polymerization with plastics, 77

X

X radiation
detection and measurement of, development of equipment for, 70
production of monoenergetic, by alpha particles, 70
use for radiation processing, 75
X-ray equipment
use in Oregon State Univ. Radiation Center, 301
X-ray fluorescence
use of radioisotope-generated, in mail-sorting apparatus, 1–2
X-ray fluorescence analysis
equipment for, design of portable, 281–84
evaluation of radioisotope-excited, for criminology, 66
uses in forensic science, 171
X-ray sources
capabilities of beta-excited, 70
feasibility of isotopic, for portable stress-analysis equipment, 70
spectra of beta-excited, compilation of, 69–70
for use in portable x-ray fluorescence analyzer, 280–84
Xenon-133
use as tracer for measuring ventilation rates, 278–79
use as tracer in sand movement studies, 171
Xylene
melting point of, radiometric method for measuring, 123

Z

Zinc
radiation transmission by, as function of temperature, γ, 122
thickness of molten, for measuring temperature by radiation transmission from ^{60}Co, 122
Zinc-69
production and uses of metastable, 182

LEGAL NOTICE

This journal was prepared under the sponsorship of the U. S. Atomic Energy Commission. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this journal, or that the use of any information, apparatus, method, or process disclosed in this journal may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this journal.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.